

Before the  
**Federal Communications Commission**  
Washington, DC 20554

In the Matter of

Facilitating Opportunities for Flexible,  
Efficient, and Reliable Spectrum Use  
Employing Cognitive Radio Technologies

Authorization and Use of Software Defined  
Radios

ET Docket No. 03-108

ET Docket No. 00-47  
(Terminated)

**REPLY COMMENTS OF SIRIUS SATELLITE RADIO INC. AND XM RADIO INC.**

Sirius Satellite Radio Inc. (“Sirius”) and XM Radio Inc. (“XM”) jointly file the instant reply comments in response to comments in the Commission’s Notice of Proposed Rulemaking and Order (“*NPRM and Order*”) in the above-captioned proceedings.<sup>1</sup> In their joint comments,<sup>2</sup> Sirius and XM noted that the FCC’s *NPRM and Order* inexplicably failed to address out of band issues created by Cognitive Radios. Several other commenters agreed with Sirius and XM that out of band emissions from Cognitive Radios should not be permitted to exceed current Part 15 limits and/or the equivalent ceilings applicable to adjacent channel licensed transmitters, even if the FCC permits Cognitive Radios to operate with increased transmitter power. On the other hand, some commenters proposed lighter regulation of Cognitive Radios that would be even more harmful

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<sup>1</sup> *Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies Authorization and Use of Software Defined Radios*, Notice of Proposed Rulemaking and Order, FCC 03-322, 18 FCC Rcd 26859 (2003) (“*NPRM and Order*”), as noticed in *Cognitive Radio Technologies and Software Defined Radios*, 69 Fed. Reg. 7397 (Feb. 17, 2004) (proposed rule and comment/reply comment dates notice).

<sup>2</sup> *Comments of Sirius Satellite Radio Inc. and XM Radio Inc.*, ET Docket No. 03-108 (filed May 3, 2003) (“*Joint Comments*”).

than the FCC's original proposal, particularly for operations in the satellite DARS band. Sirius and XM urge the Commission to reject such proposals as contrary to the public interest.

Sirius and XM are heartened by the volume of thoughtful comments that share their concern with the interference threat posed by out of band emissions under the FCC's proposal.<sup>3</sup> Sirius and XM commented that the Commission must limit out of band emissions for Cognitive Radios to be lawful<sup>4</sup> and proposed a specific limit for out-of band emissions in the satellite DARS band.<sup>5</sup> Similarly, each of the following commenters supports the premise that the Commission should not permit higher out of band emissions than allowed under current Commission rules: National Academy of Sciences Committee on Radio Frequencies, Verizon Wireless, Cingular Wireless LLC and BellSouth Corporation, CTIA, Ericsson, and WCAI.<sup>6</sup> In particular, those parties generally (1) pointed out that increases in transmitter power under the NPRM would result

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<sup>3</sup> *Comments of the Cellular Telecommunications & Internet Association*, ET Docket No. 03-108, at 11 (filed May 3, 2004) (“*CTIA Comments*”) (stating that the NPRM proposal does not contain any meaningful analysis of interference risks to in-band and out of band licensees).

<sup>4</sup> The Commission would be remiss in its duty to protect licensed services from interference if it were to implement the NPRM and Order as proposed. *Cf.*, 47 U.S.C. § 303(f) (Supp. IV 2004), (imposing a duty on the Commission to make regulations necessary to prevent interference between stations). Without addressing these critical interference issues, any decision resulting from the NPRM and Order would be arbitrary and contrary to law. *Cf.*, 47 U.S.C. §§ 301, 302a(a), 303(f), 309(a), (f) (Supp. IV 2004).

<sup>5</sup> Specifically, consistent with the existing regulatory regime, out of band emissions from unlicensed devices operating in adjacent channels—whatever their maximum transmitter power—should be obliged to reduce out of band emissions no greater than the equivalent ceilings applicable to adjacent channel licensed transmitters. *Joint Comments* at 5. In the case of Sirius or XM, cognitive radios operating in adjacent WCS spectrum should be limited to the same out of band emissions that apply to WCS. 47 C.F.R. § 27.53(a) (2003).

<sup>6</sup> *Comments of National Academy of Sciences Committee on Radio Frequencies*, ET Docket No. 03-108, at 14 (filed May 3, 2004) (“*NAS CORF Comments*”); *Comments of Verizon Wireless*, ET Docket No. 03-108, at 6 & n.10 (filed May 3, 2004); *Comments of Cingular Wireless LLC and BellSouth Corporation*, ET Docket No. 03-108, at 23 (filed May 3, 2004); *CTIA Comments* at 11; *Comments of Ericsson Inc.*, ET Docket No. 03-108, at 4, 7, 20 (filed May 3, 2004); *Comments of Wireless Communications Association International Inc.*, ET Docket No. 03-108, at 4, 17-18 (filed May 3, 2004) (“*WCAI Comments*”).

in proportional increases in out of band emissions;<sup>7</sup> (2) argued that out of band emissions should not be permitted to exceed current Part 15 limits even if increased transmitter power is permitted;<sup>8</sup> and (3) asserted that restricted bands should be preserved.<sup>9</sup> Sirius and XM wholly endorse the FCC's acceptance of these principles.

Moreover, Sirius and XM urge the FCC to reject the efforts of some commenters to increase unlicensed power above levels, or outside areas, proposed in the *NPRM and Order* because such proposals are unjustified and harmful to existing users.<sup>10</sup> For example, two commenters propose redefining the Section 15.247(b) power limit for the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands in terms of "maximum average interference power" (MAIP) rather than "maximum peak output power."<sup>11</sup> Both parties propose no limit on peak power so long as the other two factors are adjusted to keep MAIP no higher than 1 Watt. This would allow unlicensed devices to trade a shorter duty cycle for a higher power or a more focused

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<sup>7</sup> As recognized by Cingular Wireless and BellSouth Corporation, "a simple increase in output power [as proposed by the NPRM] would increase power in all of the other power dimensions (apparently including out of band emissions), as well, and thus increase the likelihood of interference." *Comments of Cingular Wireless LLC and BellSouth Corporation* at 20. Verizon Wireless also notes that the NPRM proposal to increase the power limit for spread spectrum devices by a factor of six without changing the harmonic and out of band emission levels under Section 15.247 would increase the out of band emission level by a similar factor. *Comments of Verizon Wireless* at 6 & n. 10.

<sup>8</sup> See, e.g., *WCAI Comments* at 3.

<sup>9</sup> See, e.g., *NAS CORF Comments* at 13.

<sup>10</sup> No commenter specifically proposed changes to the rules governing satellite DARS spectrum and the Commission should not change those rules in this proceeding.

<sup>11</sup> *Comments of The Wireless Broadband Operators Coalition*, ET Docket No. 03-108, at ii (filed May 3, 2004 (corrected version filed May 6, 2004)) ("*WBOC Comments*") with the attached engineering statement *Increasing TX Power in Licensed Exempt Spectrum*, *Comments of Kiwi Networks, Inc.*, ET Docket No. 03-108, at 1 (filed May 3, 2004) ("*Kiwi Networks Comments*"). Both WBOC and Kiwi Networks define MAIP as follows:

MAIP = ITX (instantaneous transmitter power) \* TX Duty Cycle \* (horizontal antenna beamwidth/360)).

beam, either of which would increase interference to affected receivers.<sup>12</sup> Moreover, a number of commenters, including WBOC, Kiwi Networks, and Dell, request that the Commission permit higher power operation by unlicensed devices everywhere, not just in rural areas.<sup>13</sup> As described in the *Joint Comments* and echoed by the commenters mentioned above, the *NPRM and Order* proposes too little—not too much—protection to existing licensed users. Satellite DARS is designed to provide constant, ubiquitous coverage over the entire co-terminus United States. As a result, satellite DARS licensees have dramatically reduced the disparity in access to radio to 45 million consumers underserved by terrestrial radio in the U.S., particularly those in rural areas.<sup>14</sup> More widespread increases in unlicensed power would inevitably lead to more widespread interference to sensitive satellite DARS receivers, endangering the provision of service to the rural users the *NPRM and Order* is designed to benefit.

The efforts of some commenters to deregulate Cognitive Radios beyond the NPRM proposal at the expense of necessary safeguards are equally wrongfooted. For example, the Wi-Fi Alliance proposes that Transmit Power Control (TPC) may not need to be implemented at all if maximum transmitter power is some amount lower than the additional 8 dB proposed in the

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<sup>12</sup> To limit this interference potential, the Commission would need to specify that peak power is limited to 6 dB above average power.

<sup>13</sup> *WBOC Comments* at 12-16; *Kiwi Networks Comments* at 1; *Dell Comments*, ET Docket No. 03-108, at 2 (filed May 3, 2004)

<sup>3</sup> *Satellite CD Radio, Inc., Application for Authority to Construct, Launch, and Operate Two Satellites in the Satellite Digital Audio Radio Service*, Order and Authorization, 13 FCC Rcd 7971, 7971-72 (1997) (“*Sirius Order and Authorization*”), *aff’d on recons.*, 16 FCC Rcd 21458 (2001), *aff’d per curiam sub nom., Primosphere Ltd. P’shp v. FCC*, Nos. 01-1526, 01-1527 (D.C. Cir. Feb. 21, 2003).

<sup>14</sup> *Joint Comments* at 2.

NPRM.<sup>15</sup> Such a change would remove a necessary mechanism to ensure that unlicensed cognitive radios operate as they should—secondary to licensed services. Moreover, commenters including the Wi-Fi Alliance, Dell, and the Software Defined Radio Forum suggest that mandatory Software Defined Radio (“SDR”) categorization and security measures are unduly burdensome.<sup>16</sup> These groups propose safety measures against tampering with SDRs should apply only where there is evidence of interference or where interference is likely to occur. Counter to these suggestions, mandatory SDR registration is a rational approach to protecting licensed services and places the burden to avoid interference where it belongs—on the unlicensed and not the licensed service.<sup>17</sup>

For the reasons set forth above, Sirius and XM respectfully request that the Commission limit out of band emissions from Cognitive Radios and reject proposals for less regulation of Cognitive Radios than that proposed in the *NPRM and Order*.

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<sup>15</sup> *Comments of Wi-Fi Alliance*, ET Docket No. 03-108, ¶ 11 (filed May 3, 2004). The Wi-Fi Alliance further proposes that TPC need not be implemented at all if more sensitive sensing is implemented. *Id.* However, the Wi-Fi Alliance fails to address how a reliance on sensing alone will prevent false negatives caused by varying signal strength caused by blockage, multi-path fading and foliage attenuation. *Joint Comments* at 4.

<sup>16</sup> *Comments of Wi-Fi Alliance*, ¶ 13; *Dell comments* at 3-5; *Comments of the Software Defined Radio Forum*, ET Docket No. 03-108, at 2-3 (filed May 3, 2004).

<sup>17</sup> In their *Joint Comments*, Sirius and XM encouraged the agency to impose mandatory regulation of software defined radios (SDRs) including strict anti-tampering measures to prevent end users from altering SDRs for unauthorized use in licensed spectrum bands. Moreover, to the extent that cognitive radios are capable of transmitting in the satellite DARS band they should not only incorporate digital frequency selection (DFS) to select the appropriate frequency based on the country of operation, *NPRM and Order*, ¶ 97, but also should transmit a unique identifier for the transmitter to identify the source of any interference caused by improper transmission in or adjacent to the satellite DARS band. *Joint Comments* at 4 & n.12.

Respectfully submitted,

XM RADIO INC.

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